AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Original) A high bandwidth multiple wavelength receiver suitable for use in a wavelength division multiplexing optical communication system, the communication system comprising a plurality of wavelength channels, each wavelength channel of the plurality of wavelength channels being of a different wavelength with respect to each of the remaining wavelength channels of the plurality of wavelength channels, the receiver comprising:

a plurality of photodetectors for receiving the plurality of wavelength channels, each individual one of the wavelength channels being received by at least one respective photodetector of the plurality of photodetectors, each individual one of the photodetectors thereby creating at least a portion of a respective wavelength channel signal, and

a plurality of high speed amplifiers, the number of high speed amplifiers being equal to the number of the plurality of photodetectors, each individual one of the high speed amplifiers being connected to a respective one of the plurality of photodetectors, each individual one of the high speed amplifiers being for amplifying a respective portion of the respective wavelength channel signal,

wherein each individual one of the photodetectors comprises:

a plurality of first elongate elements for absorbing a respective wavelength channel and thereby creating electrical carriers, the plurality of first elongate elements forming a first diffraction grating for a respective wavelength channel;

a plurality of second elongate elements for absorbing said respective wavelength channel and thereby creating electrical carriers, the plurality of second elongate elements forming a second diffraction grating for said respective wavelength channel, a period of the second diffraction grating being equal to a period of the first diffraction grating, the plurality of second elongate elements

being substantially perpendicular to and intersecting the plurality of first elongate elements so as to form a two-dimensional diffraction grating having a first common major surface and a second common major surface, said second common major surface being opposite the first common major surface;

a first electrical contact disposed on the first common major surface of the two-dimensional diffraction grating;

a second electrical contact disposed on the second common major surface of the two-dimensional diffraction grating, the first electrical contact and the second electrical contact being disposed so as to provide for electrical carrier flow through the two-dimensional diffraction grating thereby creating a respective wavelength channel signal; and

a reflector for reflecting the respective wavelength channel, the reflector being disposed on a surface of the second electrical contact, the surface being remote from the second common major surface.

2. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein the number of the photodetectors is equal to an odd integer multiple of the number of the wavelength channels.

3. (Currently Amended) A high bandwidth multiple wavelength receiver in accordance with claim 2, wherein the high bandwidth ~~multi-wavelength~~multiple wavelength receiver utilizes each respective portion of a respective wavelength channel signal to reduce noise.

4. (Currently Amended) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein each of the plurality of first elongate elements, each of the plurality of second elongate elements, each first electrical contact, and each second electrical contact comprises semiconductor material.

5. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 4, wherein the semiconductor material comprises III-V semiconductor material.

6. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 5, wherein the semiconductor material comprises AlGaAs/GaAs semiconductor material.

7. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 5, wherein the semiconductor material comprises InGaAs/InP semiconductor material.

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8. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein each of the plurality of first elongate elements and each of the plurality of second elongate elements comprises multiple quantum well infrared absorbing semiconductor material.

9. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 8,

wherein the multiple quantum well infrared absorbing semiconductor material comprises III-V semiconductor material, and

wherein the first electrical contact and the second electrical contact comprise doped III-V semiconductor material.

10. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein each reflector comprises a metal or a metal alloy.

11. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein each reflector comprises a Bragg reflector.

12. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1,

wherein each first electrical contact and each second electrical contact comprises n-type GaAs semiconductor material,

wherein each of the plurality of first elongate elements and each of the plurality of second elongate elements comprises multiple quantum well infrared absorbing semiconductor material, and

wherein each reflector comprises a metal or a metal alloy.

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13. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein the plurality of wavelength channels comprise infrared radiation.

14. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein the plurality of wavelength channels are generated by a carbon dioxide laser.

15. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 14, wherein the plurality of wavelength channels generated by the carbon dioxide laser correspond to P transitions.

16. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 14, wherein the plurality of wavelength channels generated by the carbon dioxide laser correspond to R transitions.

17. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein the plurality of wavelength channels are generated by at least one quantum cascade laser.

18. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1, wherein one of the plurality of wavelength channels is a clock signal wavelength channel.

19. (Currently Amended) A high bandwidth multiple wavelength receiver in accordance with claim 18,

wherein at least one of the plurality of photodetectors absorbs the clock signal wavelength channel thereby creating a received clock signal, and

wherein the high bandwidth ~~multi-wavelength~~multiple wavelength receiver uses the thus received clock signal for heterodyne detection of the plurality of wavelength channels.

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20. (Original) A high bandwidth multiple wavelength receiver in accordance with claim 1 further comprising an optical disperser, the optical disperser for dispersing each wavelength channel of the plurality of wavelength channels onto at least one respective photodetector.

21. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream, the communication data stream comprising a plurality of wavelength channels, each wavelength channel of the plurality of wavelength channels being of a different wavelength with respect to each of the remaining wavelength channels of the plurality of wavelength channels, the method comprising the steps of:

utilizing a plurality of photodetectors to receive the plurality of wavelength channels, each individual one of the wavelength channels being absorbed by at least one respective photodetector of the plurality of photodetectors, each individual one of the photodetectors outputting at least a portion of a respective wavelength channel signal based on a thus absorbed respective one of the plurality of wavelength channels, each individual one of the photodetectors comprises a diffractive resonant optical cavity; and

amplifying each respective thus generated portion of a respective wavelength channel signal with a respective high speed amplifier to provide a thus amplified portion of a wavelength channel signal for each respective one of the plurality of photodetectors.

22. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 21, wherein the number of the photodetectors is equal to an odd integer multiple of the number of the wavelength channels.

23. (Currently Amended) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 22, wherein the high bandwidth ~~multi-wavelength~~multiple wavelength receiver utilizes each respective portion of a respective wavelength channel signal to reduce noise.

A1 Cont.

24. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 21, wherein each of the diffractive resonant optical cavities comprises semiconductor material.

25. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 24, wherein the semiconductor material comprises III-V semiconductor material.

26. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 25, wherein the semiconductor material comprises AlGaAs/GaAs semiconductor material.

27. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 25, wherein the semiconductor material comprises InGaAs/InP semiconductor material.

28. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 21, wherein each of the diffractive resonant optical cavities comprises multiple quantum well infrared absorbing semiconductor material.

29. (Currently Amended) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 21, wherein each of the plurality of wavelength channels ~~comprise~~comprises infrared radiation.

30. (Currently Amended) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 29, wherein each of the plurality of wavelength channels [[are]] is generated by a carbon dioxide laser.

31. (Currently Amended) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 30, wherein each of the plurality of wavelength channels generated by the carbon dioxide laser ~~correspond~~corresponds to at least one of P and R transitions.

32. (Currently Amended) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 21, wherein each of the plurality of wavelength channels [[are]] is generated by at least one quantum ~~cascade.~~cascade laser.

33. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 21, wherein generating the plurality of wavelength channels includes the steps of:

generating light having a plurality of wavelengths, and

modulating light of each individual wavelength of the light having a plurality of wavelengths thereby creating the plurality of wavelength channels.

34. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 33, wherein the step of generating light uses a carbon dioxide laser.

35. (Original) A method for receiving a high bandwidth multiple wavelength, wavelength division multiplexing optical communication data stream in accordance with claim 34, wherein the step of generating light uses at least one quantum cascade laser.

36. (Currently Amended) A high bandwidth wavelength division multiplexing optical communication system, the communication system comprising a plurality of wavelength channels, each wavelength channel of the plurality of wavelength channels being of a different wavelength with respect to each of the remaining wavelength channels of the plurality of wavelength channels, the communication system comprising:

a transmitter for transmitting the plurality of wavelength channels, the transmitter including:

one or more light sources, each light source producing light of at least one wavelength, the transmitter thereby producing light having a plurality of wavelengths;

an optical modulator array, each element of the modulator array for receiving light corresponding to one of the plurality of wavelengths, each element of the modulator array for modulating the thus received light according to input data, the modulator array thereby producing the plurality of wavelength channels and transmitting the plurality of wavelength channels to a receiver, and

the receiver for receiving the plurality of wavelength channels, the receiver including:

a plurality of photodetectors for receiving the plurality of wavelength channels, a quantity of the plurality of photodetectors being equal to an integer multiple of a quantity of the plurality of wavelength channels, each one of the plurality of photodetectors for absorbing a respective one of the plurality of wavelength channels and thereby creating a respective wavelength channel signal, and

a plurality of high speed amplifiers, a quantity of the plurality of high speed amplifiers being equal to the quantity of the plurality of photodetectors, each one of the plurality of high speed amplifiers connected to a respective one of the plurality of photodetectors, each one of the plurality of high speed amplifiers for amplifying a respective wavelength channel signal and thereby producing a respective output data stream,

wherein each one of the plurality of photodetectors includes:

a plurality of first elongate elements for absorbing a respective wavelength channel signal thereby creating electrical carriers, the plurality of first elongate elements ~~comprise~~comprises a first diffraction grating for the respective wavelength channel;

a plurality of second elongate elements for absorbing the respective wavelength channel thereby creating electrical carriers, the plurality of second elongate elements ~~comprise~~comprises a second diffraction grating for the respective wavelength channel, a period of the second diffraction grating being equal to a period of the first diffraction grating, the plurality of second elongate elements being substantially perpendicular to and intersecting the plurality of first elongate elements so as to form a two-dimensional diffraction grating having a first common major surface and a second common major surface opposite the first common major surface;

a first electrical contact disposed on the first common major surface of the two-dimensional diffraction grating;

a second electrical contact disposed on the second common major surface of the two-dimensional diffraction grating, the first electrical contact and the second electrical contact being disposed so as to provide for electrical carrier flow through the two-dimensional diffraction grating thereby creating a respective wavelength channel signal; and

a reflector for reflecting the respective wavelength channel, the reflector being disposed on a lateral surface of the second electrical contact, the lateral surface opposite the second common major surface with respect to the second electrical contact.

37. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the one or more light sources is a carbon dioxide laser.

38. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the one or more light sources is at least one quantum cascade laser.

A1 cont.

39. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the transmitter further includes an optical disperser, the optical disperser for dispersing light of a single wavelength from the light having a plurality of wavelengths onto a respective element of the optical modulator array.

40. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the transmitter further includes a lens system for combining each of the plurality of wavelength channels into a single light beam for transmission to the receiver.

41. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the transmitter further includes:

an optical disperser, the optical disperser for dispersing light of a single wavelength from the light having a plurality of wavelengths onto a respective element of the optical modulator array; and

a lens system for combining each of the plurality of wavelength channels into a single light beam for transmission to the receiver.

42. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the receiver further includes a lens system for collecting the transmitted plurality of wavelength channels.

43. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the receiver further includes an optical disperser, the optical disperser for dispersing light of a single wavelength from the received plurality of wavelength channels onto a respective one of the plurality of photodetectors.

44. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the receiver further includes:

a lens system for collecting the transmitted plurality of wavelength channels; and

an optical disperser, the optical disperser for dispersing light of a single wavelength from the received plurality of wavelength channels onto a respective one of the plurality of photodetectors.

A1 Cont.

45. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein one of the plurality of wavelength channels is a clock signal wavelength channel.

46. (Currently Amended) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim [[39,]]45,

wherein one of the plurality of photodetectors absorbs the clock signal wavelength channel thereby creating a received clock signal, and

wherein the receiver uses the thus received clock signal for heterodyne detection of the plurality of wavelength channels.

47. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the communication system transmits data from one satellite to another satellite.

48. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the communication system transmits data from a ground control station to a satellite.

A1 Cont.

49. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the communication system transmits data from one naval vehicle to another naval vehicle.

50. (Original) A high bandwidth wavelength division multiplexing optical communication system in accordance with claim 36, wherein the communication system transmits data from a ground control station to a missile.